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ABSTRACT

This paper focuses on using the Internet for instruction in terms of World Wide Web-based software that project organizers or participants can use to facilitate a richer collaboration when using the Internet for inquiry lessons and that facilitates the process of developing on-line communities of learners. Knowing the potential use and strengths of this software enhances the knowledge of techniques and tools for those who wish to facilitate or participate in Internet-based instruction or an Internet-based community of learners. The following topics are discussed: (1) expected outcomes of using the Internet for instruction, including exemplary science instruction, Internet-based collaborative inquiry, and communities of learners; (2) software to promote collaborative inquiry or communities of learners; and (3) two Web-based project components and the "Forum" and "Links" software used to facilitate these processes, i.e., organizing and facilitating student-student or teacher-teacher interactions, and locating and using Web sites for the collaboration or inquiry process. (Author/AEF)

Software to Facilitate Collaborative Inquiry and On-line Communities of Learners

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Abstract: This paper will focus on using the Internet for instruction in terms of web-based software that 1) project organizers or participants can use to facilitate a richer collaboration when using the Internet for inquiry lessons, and 2) that facilitates the process of developing on-line communities of learners. Knowing the potential use and strengths of this software enhances the knowledge of techniques and tools for those who wish to facilitate, or participate in, Internet-based instruction or an Internet-based community of learners.

Introduction

More teachers are beginning to use the Internet as a tool to facilitate powerful instruction. Teachers are developing the technological and pedagogical skills for using the Internet to enhance existing activities or to accomplish tasks and activities that were once difficult or perhaps impossible to do. As the "Internet" continues to evolve, so does the ease of accomplishing successful Internet-based or assisted instruction. Four years of working with science and mathematics teachers in a large urban district, in an attempt to develop an on-line community of learners, has produced some knowledge of tools and software to facilitate this process. This paper addresses software that tends to foster greater collaboration, as well as, contribute to the development of global communities of learners. The suggestions are also congruent with what the science education community understands about exemplary science instruction and rich, collaborative inquiry in the context of the community of learners - students, teachers, scientists and others who play a role in powerful science instruction.

Expected Outcomes of Using Internet For Instruction

Exemplary Science Instruction

Science instruction, whether Internet-based or not, should provide experiences and opportunities for students to develop process-science skills and content knowledge that are forwarded in Project 2061 (1989), Benchmarks for Scientific Literacy (1993), and The National Science Standards (1996). These national efforts provide goals and indicators for those working toward exemplary science instruction. Some of the goals for students include: conveying positive attitudes about science indicating that science is meaningful and useful to them; conveying an understanding of the nature of science; identifying and solving problems effectively; working cooperatively with other students as well as independently; accessing and retrieving information, and using the existing body of scientific knowledge to investigate phenomena; and communicating ideas effectively (Berg & Clough, 1991). Many of these goals for students are facilitated when students are immersed in exemplary instruction and actively participating in science-related activities.

Within exemplary science instruction students should: 1) actively construct knowledge from what they observe and experience during the science activities; 2) ask questions, test ideas, interpret data, gather information, challenge ideas, physically and mentally manipulate objects and experiences; 3) identify problems as well as solve problems; 4) not view classroom walls as a boundary; 5) view science as having intricate connections to their daily lives; 6) develop communication skills and an understanding of the nature of science; and 7) use their scientific knowledge to generate more questions or pose and assess potential solutions to science-related problems. Using these indicators and others outlined in the National Science Standards (1996) provides criteria when choosing or developing Internet-based instruction, and knowing when the community of learners is working toward successful science instruction.

Internet-Based Collaborative Inquiry

Collaborative inquiry is defined as one classroom interacting with one or more classrooms based on a science-related investigation or topic. As outlined in Berg (1998) there is more than one right way to complete a successful collaboration. Types of inquiry include observation, sampling and analysis of wildlife, self-characteristics, environmental data, or resource awareness and consumption. In addition, collaborations may revolve around content-related, participant-dependent calculations; problem solving and engineering challenges; or debates using science knowledge. Yet, collaborations have similar general goals such as to obtain real data, draw conclusions, interact and communicate with others about the investigation, compare and contrast ideas and results and debate differences based on the merit of the data. Model or exemplary projects highlighted in Berg and Jefson (1998) provide numerous examples of how the goals and indicators listed above are intricate and necessary components of well-planned Internet-based collaborative inquiry.

Communities of Learners

This is an unprecedented time in the history of education, a time when pressures and encouragement from standards movements coincides with new technologies, tools and resources that could readily serve to support significant modifications in how students are taught science, and in what context. Never before, have science teachers, the primary architects of science instruction, had the enormous capability to readily link their students to other students, teachers, scientists, and interact based on a rich source of content and data from around the globe.

Historically, science has been thought of as what happens within the walls of the classroom. Resources for teaching are often limited to the material found between the front and back cover of a textbook. While researchers on the hunt for exemplars found situations that were quite different than the norm, the community of learners (aside from occasional guest speakers and fieldtrips) were usually limited to the students and their teacher. The "new" community of learners is now much less limited by distance, time, space as well as, the limitations of which textbook was adopted. People from many different cultures, grade levels, and experiences can come together to study science, and learn from each other. Information sources are rich and diverse, sometimes accurate and sometimes biased. The community of learners may be one partnered classroom from across the city, or numerous classrooms from across the world. It might also include a scientist from the rainforest of Costa Rica, or a scientist studying the movement of turtles in the Caribbean.

Software to Promote Collaborative Inquiry and Communities of Learners

Early experiences with the Internet required teachers to understand mainframe-based e-mail programs, and perhaps the more difficult skills such as handling attached files. Modem software, downloading files, and dealing in DOS environments provided many challenges for the novice computer user. Fortunately, the Internet environment has improved with the advent of the graphics-based web. It is more user-friendly and has lessened the importance of critical computer skills. Conversely, it has increased the number of potential teachers and students who are able to participate in Internet-based instruction.

Collaborative inquiry involves collecting and sharing data, sharing and comparing results, analyzing and formulating conclusions. An example of a simple task would be sending this information within the body of e-mail messages. Ideally, participants have the skills to exchange information in the form of text files, word-processing files, or spreadsheet files that are attached to an e-mail message. In addition, graphic images such as photos, maps or movie clips may be exchanged between participants or added to project web sites for retrieval. In some cases sound files are a useful part of the project. While much can be accomplished using e-mail and attachments exclusively, the advent of the web with graphics, sound, and web-based forms to facilitate instruction and interaction have made the process of transmitting information and interaction between classrooms much easier and less technically demanding. Many projects are now based from web home pages and contain easier methods of sharing data via forms on the web page. Participants simply need to insert data directly into the form, as opposed to sending an e-mail attachments. Worrying about the proper encoding and un-encoding formats have also been eliminated through the advent of web-based forms, as well as the automatic manner in which current web browsers handle attachments.

Software - Recent Additions and Uses

There are many potential components of a project, or the related supporting features on the project web page. Two components are highlighted in this paper and the software to facilitate these processes is identified and described. These two components are 1) organizing and facilitating student-student or teacher-teacher interactions, and 2) a project resource/related links section.

Facilitating Interactions

Collaborative inquiry might include interaction during the initial planning phase of the investigation. Usually the individual who proposes the project defines and plans the investigation, and disseminates the plans to willing partners. But, potential participants could be included in the planning phase; classrooms might submit their suggestions for how to best accomplish the task, followed by a critique of partners plans and a dialogue between classrooms as to how best accomplish the investigation. More often, collaborative inquiry usually involves collecting and sharing data, sharing and comparing results, sharing and examining other classroom's analysis and conclusions. In short, rich collaborative inquiry might involve interaction between participants in a number of ways.

As indicated previously, early methods to accomplish this task involved sending e-mail to each individual participant - the effort and workload demands increased as the number of participants increased. Consider the *Predictable Pumpkin Project* that involved over sixty participants from around the world. In some instances, establishing e-mail reflectors automated the process. After the project administrator completed a one-time entry of the participant's e-mail addresses into a list, a participant would send only one e-mail to the project's e-mail address. The e-mail would then be forwarded to all of the project participants. Current web browsers and address book functions also lessen the difficulty of ensuring that all project participants are fully informed and can interact when necessary.

But, imagine that an integral part of the project is having students read other's analysis and conclusions, and then provide a reaction or critique. Each analysis might be read and critiqued by multiple partners and the objective is to enable all project participants to have access to everyone's conclusions and the critiques that follow. The old method of asynchronously exchanging e-mail is problematic. Consider how the following software eliminates the difficulty associated with this interaction objective.

Forum Software: This web-based software is designed specifically to facilitate an asynchronous exchange of ideas. Key features include (Figure 1):
1. A participant can post their results (such as Lake Michigan Results).
2. Participants can provide their reaction - reactions are placed in chronological order of entry submission.
3. If participant X provides a reaction to participant B's posting, participant X's message is indented right below. This format makes is quite easy to visually follow the pathway of posting messages and reactions to postings. For example, Don Johnson reacted to Craig Berg, Sue Fisher reacted to Don Johnson's comments, and since Watertown High School's posting is lined up on the far left margin we know that is an original posting and not a reaction to another posting. The level of indentation makes it easy to follow the exchange of ideas.

Locating and Using Web Sites Useful for the Collaboration or Inquiry Process

A useful and sometimes critical component of Internet-assisted instruction is a list of project-related links. These other web sites might include lesson plans, content-rich sites, databases of project-related information or scientist-collected data, or any number or type of other web sites that might be major or ancillary components to the collaboration or inquiry process. The usual manner of providing a listing of useful web sites involves one person locating useful sites and then generating the list. The list may be shared in the form of e-mail, or it might be a bookmark file that would be disseminated to participants via e-mail attachments or posted as active links on the project's web page. This works well when the goal is to have one individual do all the locating and posting of sites. It becomes more difficult to compile sites and trade bookmark files as the number of participants increases, and as the number of sites located increases.

Consider the following scenario. Perhaps a community of learners - a group of 25 Biology teachers are launching an effort to work during the year to locate web sites and resources that correspond to the targeted content in Biology. Each teacher is a participant because they expect to locate sites that are useful when teaching the targeted content, and they also want to benefit from the efforts of the other Biology teachers. In short, the teachers are participating in this voluntary effort because of the potential for synergy and hope that there is a rich exchange and sharing of ideas and resources among the community of learners. Fortunately, there is software that works well when a group wants to compile web sites and provide all members with access to the useful sites.

Links Software: Links software is web-based and has the following key features (Figures 2 and 3):

1. The first task is to identify categories of targeted content and add these categories to the Links software. For Biology, categories might include things such as: Animals/Wildlife; Biology - Journals, Magazines, Newspapers; Biology Lesson Sites; Biology Professional Organizations; Environmental Science; Evolution; and Genetics/Molecular Biology.
2. After a participant locates a useful web site, they bring up the Links page and add the URL, title and description to the form.
3. Multiple participants contributing useful links results in a large number of potentially valuable resources for teaching science.
4. All participants from any computer with Internet connections can access this growing list of web sites - no trading of bookmarks. No compiling of web sites by one individual and e-mailing or working with web browser editors to add the new list to a web page.

Summary

Forum and Links software are two recent web-based additions that help to facilitate collaborative inquiry and synergy among a community of learners. As with any software, its usefulness depends on the goals and intentions of the user. For participants in collaborative inquiry who want to be involved in collecting and sharing data, sharing and comparing results, sharing and examining other classroom's analysis and conclusions, Forum software might be just the right tool to raise the interactions to a new and productive level. For a community of learners who want their efforts to locate useful web sites to benefit others, as well as benefit from other's work, Links software has the potential to make this process more seamless and less technically demanding.

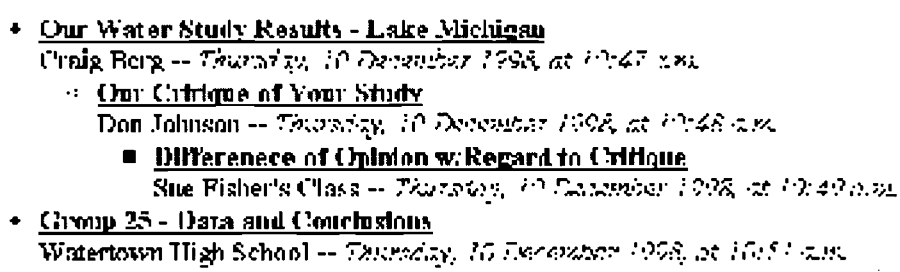

Figure 1. Example of Interaction Using Forum Software

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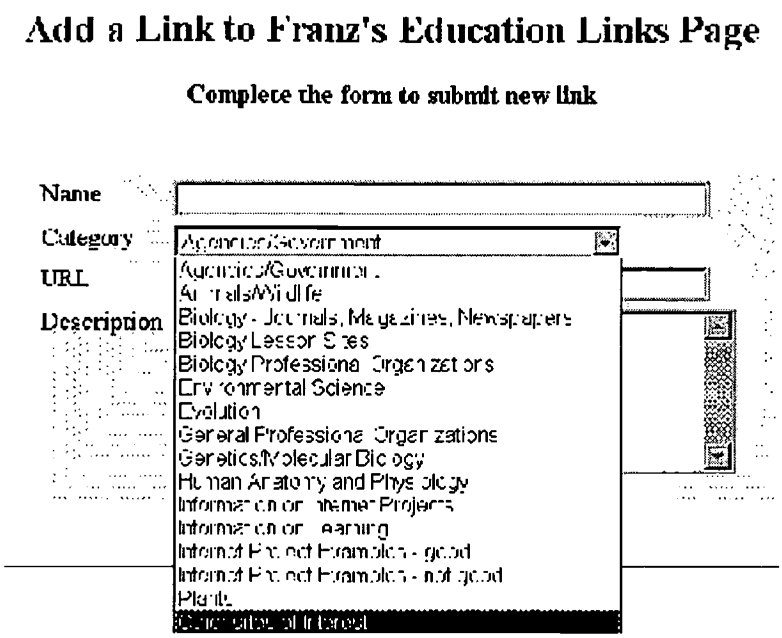

Figure 2. Pre-determined Links Categories

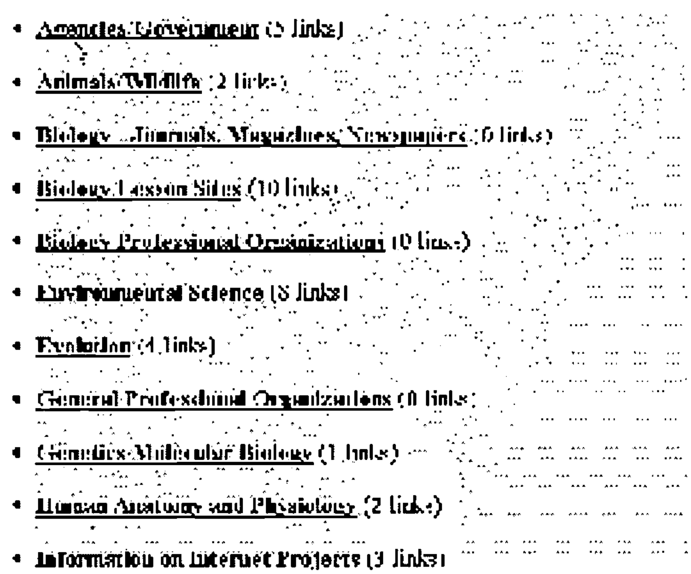

Figure 3. Categories and Number of Existing Links

References

Berg, C. & Clough, M. (1991). Generic Lesson Design: Does Science Fit the Mold - The Case Against. *The Science Teacher*. 58 (7), 26-31.

Berg, C. & Jefson, C. (1998). Top 20 Collaborative Internet-based Science Projects of 1998: Characteristics and Comparisons to Exemplary Science Instruction. Submitted to the SITE99 (Society for Information Technology and Teacher Education) Conference Proceedings.

AAAS (1989). *Science For All Americans*. Washington, DC: American Association for the Advancement of Science.

AAAS (1993). *Benchmarks For Scientific Literacy*. American Association for the Advancement of Science. Washington, D.C.: Oxford University Press.

National Research Council (1996). *National Science Education Standards*. Washington, DC: National Academy Press.

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